A Joint Publication of the Watershed Science & Wetland Science Institutes of the Natural Resources Conservation Service,
The University of North Carolina at Greensboro, and Pilot View Resource Conservation & Development, Inc.

# The Restoration & Management of Small Wetlands of the Mountains & Piedmont in the Southeast:

## A Manual Emphasizing Endangered & Threatened Species Habitat with a Focus on Bog Turtles

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## A Manual Emphasizing Endangered & Threatened Species Habitat with a Focus on Bog Turtles

AUTHORS

**Ann Berry Somers,** *University of North Carolina at Greensboro*
**Kenneth A. Bridle,** *Heritage Lands Associates*
**Dennis W. Herman,** *North Carolina State Museum of Natural Sciences*
**A. Barry Nelson,** *Engineering Tectonics, Inc.*

COORDINATOR

**Hank Henry**
*Watershed Science Institute, Natural Resources Conservation Service*

CONTRIBUTORS

Nora Murdock, *US Fish and Wildlife Service*
Steven Lund, *Army Corps of Engineers*
Dick Everhart, *Natural Resources Conservation Service*
Matt Flint, *Natural Resources Conservation Service*
Ingrid Franzen, *Nicholas School of the Environment, Duke University*
Partick D. McMillan, *North Carolina State Museum of Natural Sciences*
Elizabeth Walton, *University of North Carolina at Greensboro*

PROJECT FACILITATOR

Pilot View Resource Conservation & Development, Inc.

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***On the cover***
*Upper left: Bog turtle (*Clemmys muhlenbergii*) by Dennis Herman; bottom left: Meadow Bog by Dennis Herman: upper right: weir by Ken Bridle; lower right: Gray's lily (*Lilium grayi*) and Canada lily (*Lilium canadense editorum*) hybrid by Jennifer Mansfield-Jones.*

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Gray's Lily (Lilium grayi)

The significant problems we face cannot be solved at the same level of thinking we were at when we created them.

—Albert Einstein

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# Preface

In 1993, bog turtles (Clemmys muhlenbergii) were found in a wet meadow of the northwest Piedmont region of North Carolina during a Natural Heritage Inventory. Although the site appeared degraded and grazing pressure was heavy, there seemed to be enough remaining habitat to support a healthy population of this rare species, now protected by both state and federal law. Interest grew in the site and we began a population study which soon revealed that there were fewer turtles in the site than had been initially anticipated.

We began to talk about restoration. The US Fish and Wildlife Service saw potential for habitat improvement and provided funds through the Partners for Fish and Wildlife Program; the landowners provided the opportunity; and local conservationists provided the energy. However, hopes of success diminished as a review of the literature revealed very little on restoring, enhancing, or managing similar wetlands. But as the old adage suggests, "hope floats," and before long, enthusiasm defeated pessimism. Instead of giving up, we expanded the scope of the project from a single-site project to one that focused on conducting basic research in techniques that could lead to the development of management guidelines for similar sites. As a number of state, federal, and private agencies were promoting restoration, the need for such information became progressively more apparent. The Wetland Science Institute of the Natural Resources Conservation Service responded to this need with additional funding.

Consequently, what started out as a small part of a local Natural Heritage Inventory became a project that inspired the development of this manual. Although the outcome of that particular project was especially interesting, it need not be unusual. Conservation projects in general can have great power to pull together disparate special interests to achieve many common goals related to wetlands and the surrounding habitat, including game species management, stabilization of plant and animal populations in decline, flood control, and groundwater recharge. Restored wild areas benefit humans in many non-tangible ways also; many people not only enjoy observing wildlife, but are enriched by having intact pieces of the natural world in their surroundings.

There is no attempt here to make the readers of this handbook into soils, hydrology, wildlife, or legal experts. The assessment of soils, hydrology, biology, and topography generally require the technical assistance of natural resource conservation professionals. Alterations that change the hydrology of the land may require construction permits and evidence of design, engineering, and zoning compliance. These checks and balances are necessary to ensure that the landowner and community both benefit from correctly implemented projects, and that neither is burdened with the consequences of a failed project. Poor planning can lead to unsuccessful projects that sour the willingness of other landowners to restore wetlands. It is also important to note that until recently, and in the memory of most landowners, wetland management recommendations were usually "ditch, drain, and fill." It may take time to convince landowners and their neighbors to give up current land uses in favor of restoration. Perhaps this manual will help.

Preservation and management of wetlands for the benefit of native wild plants and animals are the major foci of this manual, but the bog turtle is highlighted because

it is considered a flagship species. Flagship species are usually charismatic animals that have the ability to generate interest in a special habitat or a conservation project, and indeed the bog turtle does just that. Nevertheless, many other plant and animal species, rare and common, depend on wetland habitats found in the Mountains and Piedmont [here considered proper names] of the Southeast. The five states in the Southeast that currently have populations of bog turtles are Georgia, North Carolina, South Carolina, Tennessee, and Virginia. While the information in this handbook was specifically developed for these five states, it may also apply to similar types of wetlands found in other states.

Finally, our intent is to help increase awareness of the value of these sites, not only to their inhabitants, but also to the other native species living in the network of wetlands and other natural communities. Any small wetland can drastically affect life beyond its edges. Besides providing refuge to the many species not found in surrounding dry, terrestrial communities, they also improve the ecology for all the wild species in the region. Wetlands may benefit some terrestrial and avian species by providing additional nesting sites, drinking water, sources of nectar, vegetation for cover, or perhaps by increasing the numbers of prey species available for consumption. We hope to assist landowners and land managers in understanding the importance of each small wetland patch and the role each plays in preservation of species and their ecosystems. Increased understanding of the values of wetland restoration will both motivate more restoration and educate the public about the vital need for this type of activity. In these days of global environmental decline and climate change, it is this type of restorative activity, to which each landowner can contribute, that will help to reverse some of the declines.

Ideally, the management strategies recommended here would be based on techniques that have been developed over years of sound scientific investigation in a variety of related fields. These fields would include hydrology, vegetational succession, population dynamics of native species, and biological and chemical limitations of alien plants. Although additional studies are underway, present knowledge of the dynamics of these systems is far from ideal. Management techniques recommended here are based on the best information available at the present time and the research and field experience of the authors. We make no pretenses that sufficient study has been conducted. To the contrary, this document is in part, a plea for more and better information that will allow small wetland management to proceed on a firm scientific foundation.

This document is only a beginning, and hopefully one that will grow and be modified as new information becomes available. We encourage you, the users of this manual (field personnel, farmers, researchers, landowners, conservationists, and critics), to respond with comments that might improve future editions.